

The rainfall, as compared with the average for July of the past three years, has been deficient in the New Orleans, Memphis, Vicksburg, Little Rock, and Mobile districts; in all other districts there has been an excess. The means of the maximum and minimum temperatures for the several districts have generally been above the average.

TEMPERATURE OF WATER.

The following table shows the highest and lowest temperatures of water observed at the several stations; the monthly ranges of water temperature; the average depth at which the observations were made; and the mean temperature of the air:

Temperature of water for July, 1885.

Station.	Temperature at bottom.		Range.	Average depth, feet and tenths.	Mean temperature of the air at station.
	Max.	Min.			
Atlantic City, New Jersey	80.2	65.2	15.0	4.8	73.3
Alpena, Michigan	74.0	65.5	8.5	12.8	64.7
Augusta, Georgia	84.0	76.1	7.9	6.2	80.7
Baltimore, Maryland	83.4	72.5	10.9	10.3	79.6
Block Island, Rhode Island	71.0	60.2	10.8	6.0	70.6
Boston, Massachusetts	70.1	56.3	13.8	20.4	71.3
Buffalo, New York	68.8	61.1	7.7	9.2	69.5
Canby, Fort, Washington Territory	89.3	81.3	8.0	8.3	82.1
Cedar Keys, Florida	85.4	79.6	5.8	41.5	81.9
Charleston, South Carolina	66.1	59.3	6.8	8.0	72.8
Chicago, Illinois	88.0	67.1	20.9	3.0	70.4
Chincoteague, Virginia	77.3	67.6	9.7	14.0	71.6
Cleveland, Ohio	75.2	72.0	3.2	24.5	74.7
Detroit, Michigan	67.7	48.7	19.0	10.1	65.5
Duluth, Minnesota	49.0	43.4	5.6	15.2	61.6
Eastport, Maine	72.8	61.7	11.1	18.1	67.6
Escanaba, Michigan	88.5	85.0	3.5	12.8	84.9
Galveston, Texas	77.9	53.4	24.5	19.0	67.3
Grand Haven, Michigan	88.6	84.5	4.1	8.7	83.0
Indianola, Texas	88.9	87.9	1.0	18.0	82.4
Jacksonville, Florida	89.0	86.7	2.3	17.6	84.9
Key West, Florida	71.6	59.3	12.3	10.0	65.3
Mackinaw City, Michigan	87.0	77.0	10.0	7.7	79.8
Macon, Fort, North Carolina	66.0	50.6	15.4	8.0	68.4
Marquette, Michigan	87.0	80.7	6.3	16.0	79.7
Milwaukee, Wisconsin	80.2	63.9	16.3	17.2	72.1
Mobile, Alabama	69.2	58.3	10.9	12.3	71.4
New Haven, Connecticut	77.8	65.0	12.8	13.8	71.2
New London, Connecticut	86.7	74.0	12.7	10.3	80.5
New York City	85.9	81.4	4.5	17.3	81.6
Norfolk, Virginia	64.1	53.1	11.0	16.9	67.6
Pensacola, Florida	73.9	69.7	4.2	57.3	68.0
Portland, Maine	81.4	69.8	11.6	11.9	74.5
Portland, Oregon	74.8	64.0	10.8	2.3	73.7
Sandusky, Ohio	63.1	58.1	5.0	36.2	60.5
Sandy Hook, New Jersey	86.8	81.8	5.0	9.8	82.5
San Francisco, California	86.5	79.8	6.7	10.8	80.6
Savannah, Georgia	82.1	71.2	10.9	13.4	75.3
Smithville, North Carolina					
Toledo, Ohio					
Wilmington, North Carolina					

• Record for first 17 days of month.

† Record for 10 days.

WINDS.

The most frequent directions of the wind during July, 1885, are shown on chart ii. by arrows flying with the wind; with the exception of a few stations, the prevailing winds in all districts east of the one hundredth meridian, were from the south or southwest; on the Pacific coast they were westerly; in the Rocky mountain districts they were variable.

HIGH WINDS.

(In miles per hour.)

On the summit of Mount Washington, New Hampshire, winds of fifty or more miles per hour occurred during the month as follows: 60, nw., 8th; 90 nw., 9th; 65, nw., 10th; 58, nw., 11th; 60, se., 14th; 56, nw., 15th; 96, nw., 17th; 83, w., 18th; 60, nw., 20th; 60, w., 21st; 60, nw., 22d; 54, sw., 24th; 61, nw., 25th; 60, nw., 26th.

Other stations reporting wind velocities of fifty miles or more per hour are as follows:

Pike's Peak, Colorado, 56, w., 5th; 52, w., 15th.

Fort Buford, Dakota, 50, w., 6th.

Poplar River, Montana, 60, n., 16th.

Fort Totten, Dakota, 53, ne., 28th.

Moorhead, Minnesota, 51, n., 29th.

LOCAL STORMS AND TORNADES.

The "New York Herald," of July 3d, contained the following:

NEW ORLEANS, July 2, 1885.—A special dispatch from Santa Rosa, Mexico, gives an account of a cyclone which passed over that section recently, doing great damage. Colonel Pedro Valdez had his out-houses blown down, and estimates his loss by breaking off and uprooting of sugar cane at several thousand dollars. Where the storm crossed the Sabine river great cottonwood and pine trees were snapped off at the roots or torn up bodily. After the storm had passed the stumps of trees looked like gigantic grass over which a mower had passed. Not a tree was left standing in its course. In San Juan del Sabinas forty houses were blown down and several persons injured. Ranches in the track of the storm were much damaged and many cattle and sheep killed. The track of the storm was four hundred yards wide and its duration from four to five minutes.

White House, Hunterdon county, New Jersey: a very heavy rain storm occurred in this vicinity at about 3 p. m. on the 6th. Rockaway creek rose to a greater height than has been known for many years; several bridges were washed away; much damage was done to crops.

Chattanooga, Tennessee: a severe wind storm is reported to have occurred during the night of the 6-7th in the vicinity of Glenn Station, Alabama, on the Memphis and Charleston railroad. A freight car was blown from the side-track at that place.

Ithaca, Tompkins county, New York: a tornado occurred at 11.30 a. m. on the 7th, passing through the village of Varua, two miles east of Ithaca. The damage to buildings was confined to sheds and other light structures.

Green Bay, Brown county, Wisconsin: a severe storm occurred here between 6 and 7 p. m. on the 8th. The most violent part of the storm was of about thirty minutes duration. Several buildings were damaged by lightning.

Sparta, Monroe county, Wisconsin: a violent storm occurred at this place during the evening of the 8th. Numerous buildings were badly damaged; fourteen cars at the Saint Paul depot were blown from the track; several cars at the North-western depot were also derailed.

Edgerton, Rock county, Wisconsin: more than two hundred tobacco sheds in this vicinity were demolished by the storm on the 8th; dwellings, barns, and other out-buildings were also damaged, and considerable live stock was killed.

At Appleton, Outagamie county, Wisconsin: a church, mill, and a number of residences were destroyed by the storm of the 8th; at Stoughton, Dane county, dwellings, barns, and tobacco sheds were also destroyed, and a number of horses and cattle were killed.

West Salem, La Crosse county, Wisconsin: the storm of the 8th was one of the most severe experienced in this vicinity for many years. Its course, in a narrow path, was from a point about three miles northwest of this place, directly eastward. The appearance of the forest indicates that there were two currents, one from the southwest and the other from the northwest. In one instance, of a fine orchard of fifty trees, about a dozen remained standing, the others having been broken off or torn out of the ground. In Lewis Valley there was a heavy fall of hail, which did great damage to the grain crops.

Cashton, Monroe county, Wisconsin: at about 7 p. m. on the 8th two storms, one coming from the southwest and the other from the northwest, met near the town of Clinton, Vernon county, forming a tornado which moved in an easterly direction, destroying much property in its course.

Neillsville, Clark county, Wisconsin: a severe storm occurred here at about 5.30 p. m. on the 8th; much damage was done to buildings, trees, etc.

Plainfield, Waushara county, Wisconsin: the storm of the 8th was one of the most violent that has ever occurred here. A large number of buildings were blown down or unroofed.

Port Edwards, Wood county, Wisconsin: a store, mill, and five dwellings at this place were destroyed by the storm of the 8th. At Dexterville, in this county, the damage by wind and lightning is estimated at \$5,000.

Waupaca, Waupaca county, Wisconsin: a destructive storm

of wind and rain occurred at this place during the evening of the 8th; much damage was done to buildings, forests, and crops.

La Crosse, Wisconsin: heavy rain, with thunder and lightning, prevailed from 7.30 to 9.20 p. m. on the 8th. For five minutes the wind blew at the rate of forty-eight miles per hour. Much damage was done to the crops in the surrounding country. On the 28th light rain fell from 4.40 to 5.15 p. m., accompanied by high wind, the velocity reaching forty-one miles.

Mr. J. Shaw, voluntary observer at Rochester, Olmsted county, Minnesota, reports the following:

A thunder-storm of unusual violence passed over this place during the evening of the 8th. The day had been the hottest and most sultry of the season; the thermometer reading 95° at 3 p. m. At that hour the wind, which had been from the south for about forty-eight hours, shifted to west. At 6 p. m. the clouds had a very threatening appearance and showers approached from the southwest and northwest, meeting about three miles south of this town, and forming a tornado at that point. The first damage was the complete destruction of a fine lot of farm buildings. The course of the tornado was slightly to the north of east, and several buildings in its path for a distance of five miles were destroyed. At the time of the tornado a strong wind prevailed at Rochester, but only a small quantity of rain fell. At 6.10 p. m. the wind changed to north and blew with almost the force of a gale, breaking down many shade trees in and about the town, and very heavy rain fell until 7 p. m., the wind frequently shifting to ne., n., and nw. After 7 p. m. the wind abated and rain gradually ceased; the total rainfall during the storm amounting to 2.56 inches. The grain crops were levelled and seriously damaged. The night passenger train on the Chicago and Northwestern railroad was delayed six hours by a washout near Sparta, Wisconsin.

Kasson, Dodge county, Minnesota: a violent wind and rain storm occurred at this place at about 6 p. m. on the 8th. Trees were prostrated and considerable damage done by lightning.

Oskaloosa, Mahaska county, Iowa: the heaviest rain storm known here for many years prevailed on the 8th, the rainfall amounting to more than five inches. Many bridges were washed away, and bottom lands were overflowed.

Grand Haven, Michigan: a severe thunder-storm prevailed during the night of the 8-9th; the wind reached a velocity of thirty-six miles per hour from the southwest.

Wilkesbarre, Pennsylvania: a violent storm occurred during the evening of the 9th. Several buildings were struck by lightning. In the surrounding country much damage was caused by the high wind and heavy rainfall.

Hartford, Connecticut: a severe storm occurred between 5 and 6 p. m. on the 9th. In East Hartford many trees were uprooted and out-buildings demolished.

Burlington, Vermont: the storm on the afternoon of the 9th caused much damage at this place and at neighboring towns. A large number of buildings were blown down or unroofed, and forests and orchards were badly damaged.

Waterbury, Washington county, Vermont: a severe storm of wind and rain, accompanied by terrific thunder and lightning, occurred during the afternoon of the 9th. A bridge, two hundred and twelve feet in length, across the Winooski river, was blown into the water and completely wrecked, entailing a loss of \$5,000. Considerable damage was also done to buildings, trees, etc. At Waterbury Centre, two children were buried under the debris of a barn which was blown down by the storm.

Charlotte, Chittenden county, Vermont: the severest storm experienced in this vicinity for many years occurred on the afternoon of the 9th. Houses were unroofed and many forest and fruit trees were blown down.

Lowell, Massachusetts: a thunder-storm, accompanied by torrents of rain, occurred in this vicinity on the afternoon of the 9th; much damage was done by lightning during the storm.

Lewiston, Maine: a violent storm occurred here on the afternoon of the 9th. Buildings were injured and other slight damage caused.

Nyack, Rockland county, New York: the barge "William J. Haskett" was caught in a severe storm when near Tomkins

Cove, on the afternoon of the 9th, and sustained serious damage.

Schenectady, Schenectady county, New York: the village of Aquaduct, on the Mohawk river, was struck by a tornado on the afternoon of the 9th. Barns were demolished, and chimneys, trees, etc., blown down. The tornado pursued a direct course for a distance of about two miles, its path being of a uniform width of fifty feet.

Boston, Massachusetts: reports from West Brookfield, Worcester county, state that during the storm of the 9th the roof was blown from a large warehouse and carried a distance of five hundred feet. Much damage was caused by lightning at various points in the state.

Reading, Pennsylvania: a tornado occurred in this (Berks) county during the night of the 9-10th, causing considerable damage to crops and buildings.

Augusta, Georgia: a severe thunder-storm passed over this city from northwest to southeast during the afternoon of the 11th. From 4.30 to 8.40 p. m. 2.70 inches of rain fell. The streets were flooded and numerous trees were blown down.

Lake Minnetonka, Hennepin county, Minnesota: at about 4.30 p. m. on the 12th the yacht "Minnie Cook" was capsized in a severe squall which suddenly swept over the lake. Seven lives were lost. The storm was also very severe at White Bear.

Pittsburg, Pennsylvania: a very destructive storm of wind and rain occurred in the Allegheny valley during the evening of the 13th. Reports state that great damage was done along the river between this place and Titusville. At Freeport it is reported that 4.50 inches of rain fell in one hour, causing the flooding of cellars, etc., and submerging railway tracks. Trains were delayed on account of the washing away of the tracks, and in some places the road-beds were covered with debris five feet in depth.

Fort Supply, Indian Territory: the afternoon of the 13th was warm and sultry; after sunset the wind backed from southeast to north, from which quarter it blew steadily until 11.20 p. m., when it increased to a velocity estimated at not less than forty-five miles per hour; at 11.24 it abated to light, but at 11.28 it increased suddenly to an estimated velocity of sixty miles, accompanied by heavy rain, thunder, and hail. The storm came from the north and was apparently of local character, as reports from points between this place and Fort Elliott, Texas, state that no storm occurred in that section.

Fort Reno, Indian Territory: a thunder-storm prevailed from 11.55 p. m. until 3 a. m. during the night of the 13-14th. Very high wind, in gusts, occurred during the storm. The garrison flag-staff was broken off at its base by the high wind.

Clarksville, Red River county, Texas: a severe wind storm occurred in this vicinity on the 14th; considerable damage was done to crops and orchards.

DeKalb, Bowie county, Texas: the severest rain storm of the year swept over this vicinity on the morning of the 14th. The storm was severest to the west of this place; it lasted about one hour and caused considerable damage to the corn and cotton crops. Large trees were blown down, and in some instances the roadways were completely blocked.

Richardton, Stark county, Dakota: a severe storm of wind and hail occurred at Hebron, fourteen miles east of this place, on the 15th, destroying buildings and crops. The storm was also very destructive at points six miles southeast of Richardton.

Huron, Dakota: at 6.30 p. m. on the 15th a funnel-shaped tornado cloud was observed to the west of this station. At 10.10 p. m. a heavy rain storm occurred, accompanied by incessant lightning and very loud thunder. The storm moved from northwest to southeast.

Owatonna, Steele county, Minnesota: a severe wind and rain storm passed over this vicinity during the night of the 15-16th, destroying a number of shade trees and prostrating fields of grain; much damage was done by lightning.

Red Wing, Moody county, Dakota: a violent wind and rain storm passed over this place at about 2.30 a. m. on the 16th, blowing down trees, etc.

Athens, Clarke county, Georgia: a severe storm passed through this vicinity from southeast to northwest on the 18th; it caused considerable damage to buildings and crops.

Milwaukee, Wisconsin: a thunder-storm, accompanied by very heavy rain, prevailed from 6.40 to 8.25 p. m. on the 19th; no damage was done in this vicinity, but to the northward of station the storm was very severe. A maximum wind velocity of thirty-six miles from the northwest occurred at 7.30 p. m.

New Britain, Hartford county, Connecticut: a storm of unusual severity occurred at 4 p. m. on the 21st. In the upper part of the town about one hundred trees were blown down.

Archer, Alachua county, Florida: a severe storm, blowing down buildings, trees, etc., occurred here at 3.30 p. m. on the 21st.

Muncie, Delaware county, Indiana: a severe storm of wind and rain passed through the southeastern part of this county during the evening of the 22d. The growing crops were seriously injured and out-buildings, fences, etc., were blown down.

Columbus, Ohio: a severe storm passed over this city from northwest to southwest during the afternoon of the 22d. Although the velocity of the wind in the city did not exceed twenty miles per hour, at points two miles distant the storm assumed the character of a tornado, uprooting trees, etc.

Richardton, Stark county, Dakota: at 4 p. m. on the 23d a violent storm of wind and hail completely destroyed the crops over a strip of country six miles in length, south of Richardton.

Omaha, Nebraska: a very severe thunder-storm moving from southeast to northwest, occurred at this station between 1.43 and 2.10 a. m. on the 25th. The rainfall was remarkably heavy and caused considerable damage.

Lancaster, Pennsylvania: the storm on the night of the 26-27th, was very severe in this vicinity. The corn and tobacco fields were badly washed, entailing a heavy loss.

Moorhead, Minnesota: reports from the surrounding country state that the crops were badly damaged by a severe storm on the morning of the 28th. Threatening clouds were observed to the northwest of station, but no storm occurred at this place. A violent thunder-storm from the northwest occurred at about 7 a. m. on the 29th; from 7.45 to 7.50 a. m. the wind blew at the rate of sixty miles per hour. This latter storm is considered one of the severest ever experienced here, and caused much damage in the city and vicinity. Buildings were unroofed, trees uprooted, and crops in the surrounding country were badly damaged. Much damage was done by lightning both at Moorhead and Fargo, Dakota.

Doylestown, Bucks county, Pennsylvania: shortly after 4 p. m. on the 29th a tornado passed over the western part of Hilltown, in this county, causing the destruction of buildings, fences, etc.

Dubuque, Iowa: a severe storm, accompanied by heavy rain, occurred here during the evening of the 29th, causing much damage to buildings in course of erection.

Louisville, Kentucky: from 4.30 to 8.32 p. m. on the 30th a thunder-storm, accompanied by very heavy rain, prevailed. For ten minutes the wind blew at the rate of thirty-six miles per hour. Small hail fell from 5.02 to 5.07. The temperature fell from 96°.8 to 73°.

The following are reports received from the special tornado observers of the Signal Service, of whom there are more than 1,400:

Stratford, Strafford county, Kansas: a tornado occurred here at 3 p. m., on the 1st. The cloud was funnel-shaped and moved in a northeasterly direction for a distance of three miles, its path being from one hundred to two hundred feet wide. Heavy rain and thunder occurred before and after the passage of the tornado-cloud. A dwelling and barn were destroyed. The shortest time in passing a given point was one minute.

Lind, Waupaca county, Wisconsin: a tornado occurred here at 8 p. m., on the 8th. It was accompanied by an unusual electrical display. Thirty buildings were unroofed or destroyed.

Madison, Wisconsin: a tornado occurred here at 9 p. m., on

the 8th. The cloud was balloon-shaped and moved in a direction from northwest to southeast, its path being about one-half mile in width. One building was destroyed and several were unroofed. The damage is estimated at \$40,000.

Monticello, Wright county, Minnesota: a tornado occurred five miles north of this place at 3.25 p. m. on the 8th. The cloud was funnel-shaped and moved in a direction E. 20° N. for a distance of three miles, and then disappeared. The diameter of the tornado-cloud is reported to have been about fifteen feet, and the direction of the whirl was contrary to the movement of the hands of a watch. One dwelling and an out-building were destroyed.

Oshkosh, Winnebago county, Wisconsin: a tornado occurred twelve miles west of this place at 8 p. m. on the 8th. No damage was reported.

Winona, Winona county, Minnesota: at 5 p. m. on the 8th a tornado-cloud was observed at this place; it did not touch the ground, and disappeared when near the city. A severe storm of wind and rain, accompanied by a brilliant electrical display, followed.

Allegan, Allegan county, Michigan: a tornado occurred here at 11.40 p. m. on the 8th. The tornado cloud moved from southwest to northeast in a path two hundred feet wide. A large barn was destroyed, two others were unroofed, and many trees, fences, etc., were demolished. The damage is estimated at \$10,000.

Kent's Hill, Kennebec county, Maine: a tornado occurred at this place at 4.05 p. m. on the 9th, its path being about eight miles in length. It caused much damage to barns, trees, etc.

West Brookfield, Worcester county, Massachusetts: a tornado occurred here at 4.35 p. m. on the 9th. The cloud was funnel-shaped and moved from southwest to northeast. But little damage was done.

North Springfield, Green county, Missouri: a tornado occurred here at 4 p. m. on the 10th. The cloud was funnel shaped and moved in a southeasterly direction. No damage resulted.

Harold, Hughes county, Dakota: a tornado passed through the villages of Highmore and Holabird, in Hyde county, on the afternoon of the 15th. It started about ten miles north of Harold and then passed through the places above named. The tornado-cloud was funnel-shaped, and moved in a southeasterly direction until reaching Highmore, where its course changed to the eastward. At one time there were eight funnel-shaped clouds visible; all but two of these had disappeared when the storm struck Highmore. Fifteen dwellings and a church were destroyed, and two persons were killed. Damage estimated at \$40,000 was done at Highmore; damage to the extent of \$15,000 was also done at other points in Hyde county.

Upland, Jewell county, Kansas: a tornado occurred here at 5 p. m. on the 26th. At one time there were observed to depend from the front of the storm cloud twenty funnel-shaped clouds; these were constantly varying in form and position. The electrical display was intense in the surrounding clouds, but no electricity was observed in the funnel clouds. The progressive velocity of the storm was estimated at forty miles per hour. No damage resulted, as the storm occurred in an open plain.

NAVIGATION.

STAGE OF WATER IN RIVERS.

In the Arkansas, Mississippi, and Missouri rivers the highest stages at all stations, with one exception, viz., La Crosse, Wisconsin, on the Mississippi, occurred between the 1st and 10th; and the lowest stages during the latter half of the month.

In the Ohio river, at Pittsburg, Pennsylvania, navigation was suspended on account of low water on the 5th; and Professor Börner, at Vevay, Indiana, reports that the river opposite that place reached a stage so low, on the 19th, as to render navigation dangerous.

Navigation in the Cumberland, at Nashville, was suspended on account of low water on the 25th.